ANTHIDIINE BEES IN THE COLLECTION OF THE NATURAL HISTORY MUSEUM OF SAN DIEGO, CALIFORNIA

By Herbert F. Schwarz

For the opportunity to examine the specimens reported upon in this paper I am indebted to Dr. Clinton G. Abbott, who at the kind suggestion of Professor T. D. A. Cockerell submitted them to me. Although the material does not include any new species, the large series of some of the existing species gives opportunity to demark the range of variability that these species present. Of incidental value may also be the new locality records. Almost without exception the species reported upon were collected in California and for the most part in San Diego County. Because of this fact it has seemed appropriate to add a plate, skilfully drawn by Mr. Pierre-Noël, presenting contrasts as well as resemblances in the structure and the maculation of the clypeus of the female of certain California species of *Anthidium*. The dentition or lack of dentition of the clypeus are characters not infrequently neglected in the descriptions. Although there is sometimes great similarity between the clypeus of two species—for instance, *placitum* (Fig. F) and *edwardsii* (Fig. G)—such species may differ fundamentally in other respects. The female of *placitum*, for example, has a tooth on each side of its apical tergite while the female of *edwardsii* is devoid of such teeth. Nevertheless, comparative study of a character has its interest although not in itself conclusive as to the affinities of the insects that share that character. There is frequently variability in respect to the maculations in a given species, and not always are even the individuals of that species bilaterally symmetrical. A case of asymmetry is shown in the maculation of the clypeus of *collectum* (Fig. D).

Anthidium atripes (Cresson)

(Fig. B)

California.—Laguna Mts., San Diego County, June 29, 1921, 1 ♀ and 1 ♂; Laguna, San Diego County, June 7, 1926, 3 ♂♂,

collected by W. S. Wright; Pine Valley, San Diego County, June 27, 1927, 1 ♂; without locality designation, 1 ♀.

This species, which Cresson originally described merely as a variety of *emarginatum,* although structurally as well as in its maculations it is distinct, is nevertheless much more variable than I had been led to believe from an examination of the few specimens that up to the present have been available. Cresson's type —a male—is largely covered with black hair instead of the silvery hair so characteristic of the vast majority of the males of *Anthidium.* In the present series the males all have silvery hairs greatly predominant; in most of them indeed the black hairs are traceable, if at all, only on the under side of the abdomen and on the metatarsi (especially those of the middle pair of legs), but even in these areas the pale hairs greatly outnumber the darker ones. What makes for pause in separating these insects from typical *atripes* is that similar diversity in the color of the hairs, presenting both of the extremes as well as intermediate conditions, occurs in other species (*vide* Cockerell, 1925, Proc. Cal. Acad. Sci., (4), XIV, p. 356; Schwarz, 1927, Amer. Mus. Novitates, No. 252, pp. 1–5, and Schwarz, 1928, Jour. N. Y. Ent. Soc., XXXVI, pp. 372–377).

Not only is there variability in respect to the color of the hairs but also with respect to the maculations. Of the five males submitted by the Natural History Museum of San Diego, four resemble the type in having either wholly black legs (as indicated in Cresson's description of *atripes*) or at most a tiny spot—easily overlooked—at the base of the fore tibiæ. The fifth specimen—one of those from Laguna—has a larger maculation at the base of both the fore and the middle tibiæ, a stripe at the apex of the fore tibiæ supplemented by a maculation at the base of the fore metatarsi, and a splash of color near the apex of the fore femora. In all the five males the bands on the tergites are "deeply emarginate and interrupted" and in three of these males tergites 5, 6, and 7 are entirely black, showing in this respect a greater degree of melanism than the type, which has at least two dots on tergite 5 although it has tergites 6 and 7 black. However, by way of offset, the other two male specimens have the abdomen more maculated than the type. One of them—a specimen from Laguna with

black legs—has on tergite 5 two quadrate spots with a transverse line extended laterad from the apex of each of them, on tergite 6 two spots of irregular shape, on tergite 7 two spots localized on the lateral lobes. The other—likewise a specimen from Laguna with wholly black legs—agrees with the type in having two small maculations on tergite 5 and an immaculate tergite 6 but differs in having the lateral lobes of tergite 7 each with a maculation.

The two females submitted have more black hairs than the males, yet are not as dark in appearance as the female I described (Schwarz, 1928, Jour. N. Y. Ent. Soc., XXXVI, pp. 389–390). Virtually the entire head (except for a few interspersed black hairs on the clypeus in the specimen without locality designation) and the sides of the thorax as well as the mesonotum are covered with silvery hairs. The hairs of the legs, too, are mainly pale although the metatarsi and other tarsal joints and to some extent also the tibiæ, especially the middle and hind pair, have considerable dark hair. In the specimen without locality designation the hairs on tergites 5–6 and on the apex of tergite 4, as well as the ventral scopa, are black. In the female from Laguna Mts. the ventral scopa is black except for a few silvery bordering hairs at the side, but the two apical tergites, instead of black, have for the most part silvery hairs thinly interspersed with black. The two females in question agree with the female I described in having the legs immaculate, and one of them is in further agreement with that female in also having tergites 5–6 immaculate. In the other specimen tergite 6 is immaculate but tergite 5 has two faint spots. Tergites 3–4 are more fully maculated in these two females than in the female I described although their maculations are not of uniform extent, and both of them have the lateral halves of the band on tergite 1 without emargination—in one of the two specimens, however, this band has imbedded dark spots. In both of these females the axillæ as well as the scutellum are maculated whereas in the accompanying males it is only the scutellum that has yellow spots.

Anthidium banningense Cockerell

(Fig. C)

California.—Lake Tahoe, July 8, 1926, 1 ♀ and 1 ♂, collected by W. S. Wright.

These are the only two specimens in the collection from Lake Tahoe and the fact that the female accords with the specimens that I have previously interpreted as that sex of *banningense* (Schwarz, 1928, Jour. N. Y. Ent. Soc., XXXVI, pp. 390–391) lends support to the correctness of that association.

Anthidium collectum Huard

(Fig. D)

California.—Laguna, San Diego County, June 7, 1926, 1 ♂, collected by W. S. Wright; Warner's, San Diego County, Aug. 6, 1921, 1 ♂; San Diego, April 20, 1921, 1 ♀.

The last visible sternite of the male of *collectum* has like the corresponding sternite of *palliventre* a triangular emargination at the apex of its middle element, but the lateral spines of this sternite are shorter and sharper in *collectum* than in *palliventre,* while the exterior lobes of the pygidium are in *collectum* rather straight at least along their outer margin whereas in *palliventre* they are shaped somewhat like the horns of a crescent. The strong yellow stripes on the external surface of the tibiæ still further differentiate the male of *collectum* from the male of *palliventre* with its black tibiæ.

Anthidium clypeodentatum lutzi Schwarz

(Fig. A)

California.—Warner's, San Diego County, Aug. 1, 1921, 1 ♀.

The single female here reported upon differs slightly from the original description of this variety (Schwarz, 1928, Jour. N. Y. Ent. Soc., XXXVI, pp. 380–381). In contrast with the condition in the type of *lutzi,* the apex of the clypeus is strongly dentated medianly as well as laterally, with a total of seven clearly defined teeth. In typical *clypeodentatum* there is considerable variability in the dentition of the clypeus (see Schwarz, 1928, Canadian Entomol., LX, pp. 215–216) and it is to be presumed that there is a similar range of variability in the variety *lutzi.* There is a clearly defined carina down the middle of the clypeus in the specimen from Warner's that is sometimes only obscurely present in typical *clypeodentatum.* The black area down the middle of the clypeus is more extensive in the present specimen

than is indicated for the type, somewhat suggesting the condition in *placitum*. The specimen lacks a maculation on the mesopleura, has the hind coxæ black, and the stripes on the under side of the femora confined to the apical half. However, the variability in the maculations of Anthidiines, even when a given species is obtained from a single locality, is apt to be considerable and accordingly I place this specimen in the variety *lutzi*, with which it agrees in so many essentials.

Anthidium fontis Cockerell

(Fig. E)

California.—Warner's, San Diego County, July 29, 1921, and Aug. 1–6, 1921, 2 ♂♂.

Anthidium maculosum Cresson

(Fig. H)

California.—San Diego, July 20, 1920, 1 ♂, collected by W. S. Wright; Warner's, San Diego County, Sept. 1920, 3 ♀♀ and 6 ♂♂, collected by George H. Field; Pine Valley, Aug. 1, 1927, 1 ♀, Aug. 6–21, 1927, 3 ♀♀ and 1 ♂. Arizona.—Summerhaven, Alt. 7700 ft., Santa Catalina Mts., Aug. 12, 1934, 1 ♀, collected by Ian Moore. There are also four males without locality designation bearing the following accession numbers: 631 (two of them), 638, and 591.

The females of this series are rather constant from specimen to specimen in respect to their maculations. The males also differ relatively little. Most of them have the middle and hind metatarsi yellow externally but the fore metatarsi black; on the other hand, there are some that have yellow also on the front metatarsi, usually in such cases over the entire outer surface of the joint but in one instance only over the basal half.

Anthidium mormonum fragariellum (Cockerell)

California.—Laguna, San Diego County, June 16, 1926, 1 ♂, collected by W. S. Wright.

This specimen, like Cockerell's type of *fragariellum*, has "a pair of large cuneiform patches, deeply incised posteriorly" on tergite 1 of the abdomen.

Anthidium placitum Cresson
(Fig. F)

California.—Pine Valley, San Diego County, 2 ♀♀ and 1 ♂, Aug. 1, 1927, collected by F. W. Kelsey, and 15 ♀♀ and 18 ♂♂, Aug. 6–21, 1927.

This large series—all from a single locality and collected in the course of a single month—nevertheless shows variability in its markings. Of the males some have the scape in front fully maculated, others only partly maculated, others not at all. The maculation above the summit of the eye of the male is sometimes merely spot-like, sometimes linear and extended inward for a distance as great or greater than that which separates the maculation from the corresponding maculation above the other eye. All of the males have L-shaped stripes antero-laterally on the mesonotum, a maculation on the axillæ that is confluent with a broad stripe-like maculation bordering the posterior half of the scutellum except for a brief interruption at the middle, maculated tubercles, and a maculation anteriorly and a smaller maculation posteriorly on the tegulæ. All of the males, too, have stripes on all of the femora but of somewhat variable development, and all of them have the tibiæ and tarsi externally yellow. In seventeen of the males the propodeum is wholly black but two have yellow maculations in this region—a condition more usual in the female. Throughout the series all seven tergites bear maculations but not of altogether uniform richness, some of the males being quadrimaculate on tergite 1, others bimaculate. The degree to which the bands on the subsequent tergites are emarginate above also varies as does the degree of the fusion or separation of the two halves of the bands on tergites 4 and 5.

In the females there is also variability. I have already discussed the instability of maculation in the female of *placitum* in a previous paper (1927, Amer. Mus. Novitates, No. 252, p. 17). The differences there noted in the few specimens then available, likewise from San Diego County, are confirmed and extended in the much larger series now before me. In many of the specimens the stripe on the scape is confined to the base, in other cases it runs from base to apex, in two specimens the stripe is absent. The band of black down the middle of the otherwise yellow clypeus

is of variable width, sometimes terminates before reaching the apex, and in rare instances has almost disappeared. The stripe on the vertex is sometimes nearly continuous, at other times interrupted by a space equalling that between the lateral ocelli; in none of the females are these maculations merely spotlike as in some of the males. The thorax of the females viewed from above is maculated as is that of the males, the maculations being pretty well standardized from specimen to specimen. On the other hand, the two spots on the propodeum that in a key to the females of *Anthidium* (1927, Amer. Mus. Novitates, No. 253, p. 15) I used as a character for the separation of *placitum* are of very variable development, are faint in several of the specimens, and in three cases out of the seventeen even lacking. The legs in all the specimens are predominantly yellow, but there is some variability nevertheless in the extent of the surviving black areas on the femora and elsewhere. In only one of the specimens before me is the band on tergite 1 subdivided into four parts; in all the other cases there is merely a median division, the two halves posteriorly emarginate. The degree of fusion or separation medianly of the bands on tergites 4–5 shows variability as in the male, tergite 5 being almost invariably continuous although emarginate. It is somewhat exceptional to find the maculation on tergite 6 of the female completely subdivided into two spots although the two elements are frequently semidetached.

Callanthidium illustre (Cresson)

California.—Pine Valley, San Diego County, Aug. 1, 1927, 2 ♂♂, collected by F. W. Kelsey.

Dianthidium parvum swenki Schwarz

California.—Pine Valley, San Diego County, Aug. 6–21, 1927,

Dianthidium pudicum consimile (Ashmead)

California.—Warner's, San Diego County, Sept. 1920, 1 ♀, 1 ♂, collected by George H. Field; Pine Valley, San Diego County, Aug. 1, 1927, 1 ♀.

The females are doubtfully assigned to *consimile*. Their maculations are in accord with those of *consimile* but the slightly curvilinear emargination between the second tooth of the mandible and

the inner angle of the mandible is more indicative of the condition usually observed in *davidsoni*. It is possible, therefore, that the females in question are slightly undermaculated representatives of *davidsoni*.

Dianthidium ulkei davidsoni (Cockerell)

California.—Pine Valley, San Diego County, Aug. 6–21, 1927, 2 ♂♂.

Anthidiellum robertsoni (Cockerell)

California.—Warner's, San Diego County, July 29, 1921, 1 ♀; San Diego, July 27, 1921, and Aug. 25, 1921, 2 ♂♂; Pine Valley, San Diego County, Aug. 6–21, 1927, 1 ♂.

In two of the males the inverted T-shaped figure in black on tergite 6 is imperfectly formed, one of them having a black area only in the region between the tuberculate prominences without the supporting shaft of the T. In this specimen tergites 4–5 are not four-spotted after the usual manner but are bimaculate with a semienclosed black spot apically in each of the maculations.

Paranthidium jugatorium variety **perpictum** (Cockerell)

Arizona.—Summerhaven, alt. 7700 ft., Santa Catalina Mts., Aug. 18, 1934, 2 ♀♀ and 1 ♂, collected by Ian Moore.

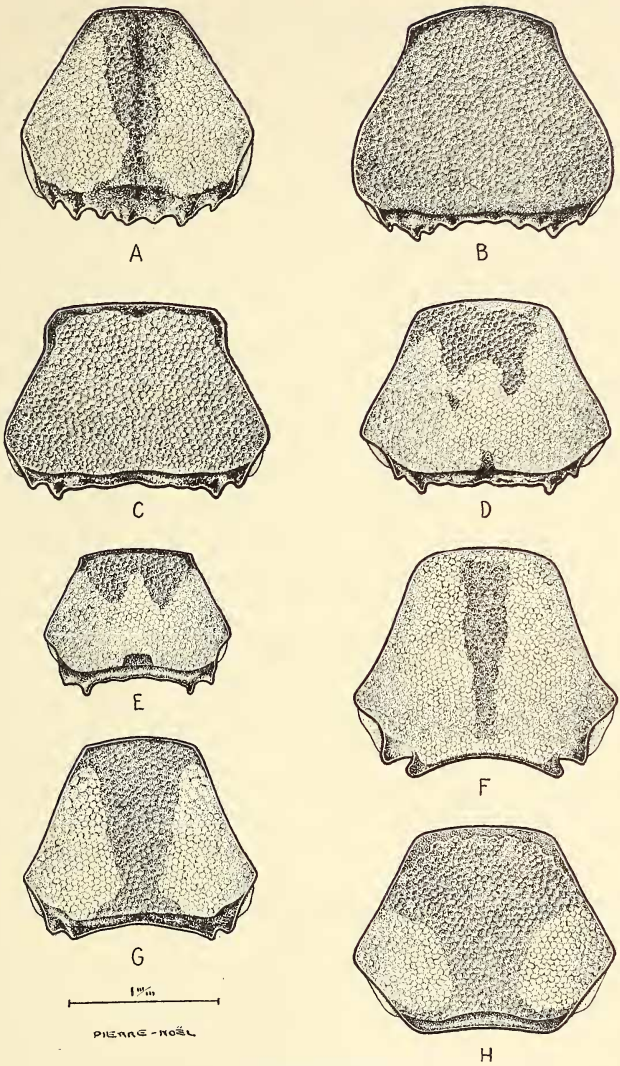
One of the females has a virtually continuous band across the vertex and rather broader lateral face-marks than is usual in the variety *perpictum,* in these respects somewhat resembling the variety *lepidum* of the Southeast.

The variety *perpictum* is known to occur in New Mexico and Colorado. This is, I believe, the first record of its occurrence in Arizona.

PLATE 28

Clypeus of Female of California Species of *Anthidium*

A. *Anthidium clypeodentatum lutzi* Schwarz
B. *Anthidium atripes* (Cresson)
C. *Anthidium banningense* Cockerell
D. *Anthidium collectum* Huard
E. *Anthidium fontis* Cockerell
F. *Anthidium placitum* Cresson
G. *Anthidium edwardsii* Cresson
H. *Anthidium maculosum* Cresson



ANTHIDIUM